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ON SOME LIVING AND FOSSIL SNAILS OF THE GENUS PHYSA, FOUND AT LAS VEGAS, NEW MEXICO.

BY ADA SPRINGER.

In the Pleistocene beds of the Arroyo Pecos at Las Vegas, N. M., are found many fluviatile and terrestrial shells, including the genera *Physa*, *Limnæa*, *Planorbis*, *Ancylus*, *Pisidium*, *Sphærium*, *Pyramidula*, *Succinea*, *Helicodiscus*, *Zonitoides*, *Pupa*, *Bifidaria*, *Pupoides* and *Vallonia*.

None of the species, so far as known, are extinct, but some (*e.g.*, *Sphoerium magnum* Sterki MS.) do not appear to exist any longer in the vicinity; while others exhibit varietal characters which seem to distinguish them more or less from their living representatives. The genus *Physa* is represented in those beds by very numerous individuals, differing considerably in form, but apparently all pertaining to a single species. This species has been identified at the National Museum as *Physa humerosa* Gould, and there is no reason to doubt the identity. The original description of *P. humerosa*, kindly copied by Mr. C. T. Simpson, is as follows:

"Testa subrhomboidea, solidula, polita, albida; spira acuta; anfrac. 5, tabulatis; apertura ½ ad ⅔ long. testæ adequans, postice rotundata; labro expanso; columella vix plicata, callosa, fere perforata.

"Long ½ ad 7/10 poll.; lat. ⅜ poll. Found by Thomas H. Webb and by W. P. Blake, in the Colorado desert and at Pecos river.

"The broadly tabulated whorls, and the acute, elevated spire and foldless pillar clearly distinguish this species. It is like *P. tabulata* Gould, and the variety figured by Haldeman as *P. ancillaria* (fig. 7), which he regards as a monstrosity; the deep suture and the simple columella distinguish it from that species."

The species was first published in *Proc. Bost. Soc. Nat. Hist.*, Vol. V, p. 126, February, 1855. The National Museum possesses two shells from Colorado lake, received originally from Blake (Lea Collection), which are supposed to be cotypes. Mr. Simpson has kindly made a drawing of one of these. Dr. R. E. C. Stearns[1] has figured a number of specimens of *Physa* from the Colorado desert; these are variously referred to *humerosa*, *mexicana*, etc.

It would appear that the original *humerosa* was described from fossil or subfossil shells, such as are common in the Southwest in certain localities ; and furthermore, that the specimens taken as typical represented a rather extreme variation.

In the series from the Arroyo Pecos Pleistocene, some shells agree well with the original *humerosa*, but these pass by insensible gradations into forms which agree with what has been regarded at the National Museum and by Dr. Stearns as *P. mexicana* Philippi. Whether these latter are the genuine *mexicana* may only be determined when it is possible to study topotypes with the soft parts.

It was also found that many shells from the Arroyo Pecos could not be separated from the common *Physa* still living at Las Vegas, though there were certain average differences between the living and fossil series. The living species has recently been described by Crandall[2] as *Physa rhomboidea*. Part of Crandall's original material came from Las Vegas; he says the species " is distinguished by its robust appearance, deep sutures, constricted aperture and umbilicus, which will be found in a large part of them. It is more like *P. solida* Philippi than any other species." It has impressed spiral lines like *P. gyrina*, etc.

For purposes of comparison large numbers of *P. rhomboidea* were collected from a pool in the Gallinas river at Las Vegas. The variation in this series, all from the same place, was very great, and selected specimens would readily be taken for distinct species. However, upon close comparisons, no difference could be found in the soft parts. Externally, the animals were the same; internally, there were some variations, as in the length of the œsophagus, but these were not correlated with the differences in the shells, and were clearly not of specific value. The teeth were of the same type in all.

In order to determine whether the teeth could be used in distinguishing Western species of *Physa*, I examined *P. virgata* Gould, collected by Mr. Cockerell in Salt river, Tempe, Ariz., and a species identical with what has been regarded at the National Museum as *P. lordi*, collected by Mr. C. H. T. Townsend in the Organ mountains, N. M. It was found that these differed materially from one another and from *P. rhomboidea*, and also from *P. gyrina* as figured by F. C. Baker. The following table indicates the nature of the differences:

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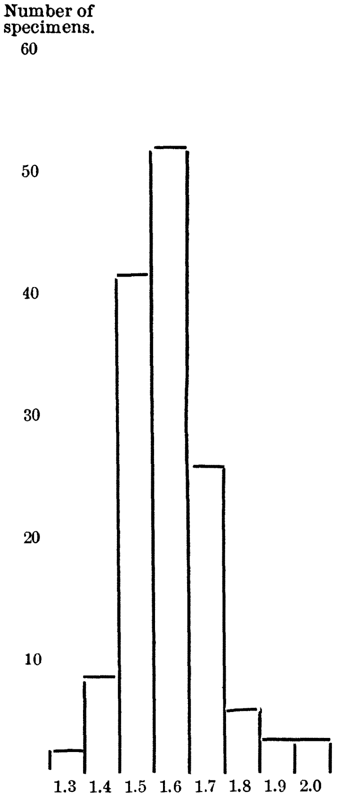
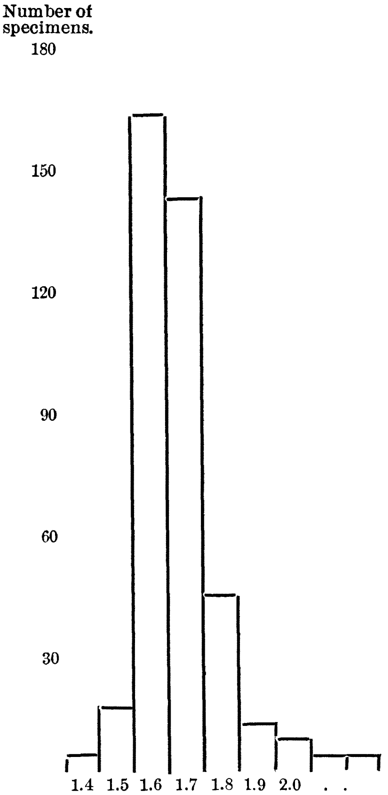
[1] *Proc. U. S. Natl. Museum*, XXIV, Pls. XXIII, XXIV.

[2] *Nautilus*, August, 1901, p. 44.



Ratio of length to breadth (average of whole series 1.5).
P. humerosa, Arroyo Pecos (fossil), 145 specimens.



Ratio of length to breadth (average of whole series 1.8).
P. rhomboidea, Gallinas river (recent), 445 specimens.

Frequency polygons.

Fig. 1. Fig. 2.

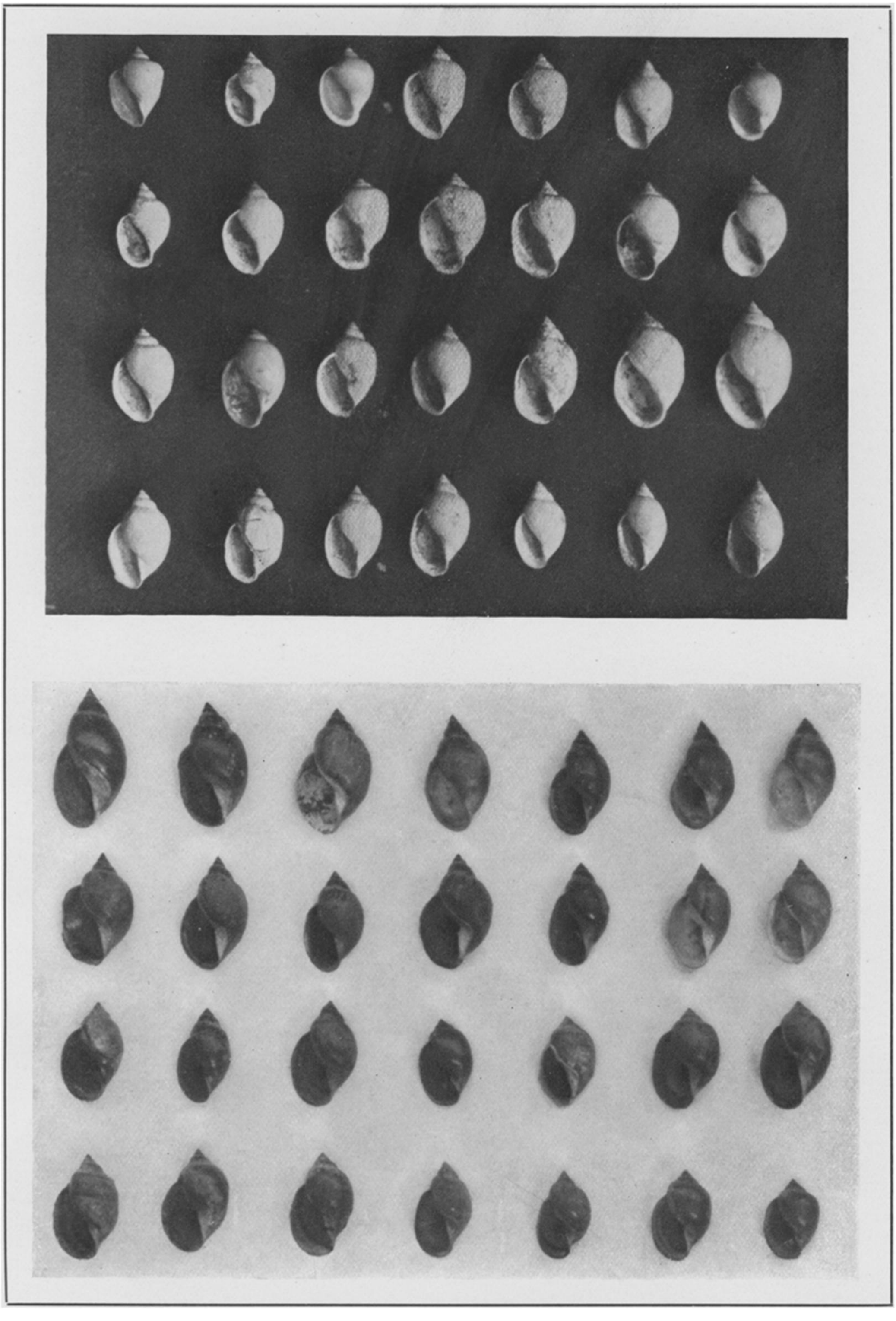
Lateral teeth with denticles of two sizes, long ones alternating with short, ... 1
Lateral teeth with long denticles, not obviously of two sizes, . 2

1. Lateral teeth with the longer denticles very long; median teeth broad, with the denticles in one transverse series, *P. "lordi"* (New Mexico).
   Lateral teeth with the larger denticles short, median teeth with the denticles in three groups, ... *P. gyrina.*
2. Lateral teeth with the denticles seven in number (counting the apical one), straight or nearly so; median teeth with the denticles in three groups, ... *P. rhomboidea.*
   Lateral teeth with the denticles five in number, very oblique; median teeth with the denticles rather long, in one group, *P. virgata.*

Individual teeth of any species may vary from the normal type, but it is easy to determine the normal character.

Figs. 1 and 2 show the frequency polygons for the fossil (Arroyo Pecos) and recent (Gallinas river) series, based on the relation of the length of the shell to the breadth—the most obviously variable character. It is found that the mode, or point of greatest frequency, is the same in both, but the skew is toward greater breadth in the fossils, toward narrowness in the recent shells. It is concluded that all the shells belong to one species, which has been evolving from a broader to a narrower form, perhaps in consequence of a decreasing salinity or flow of the water. Plate XXVI shows a series of each type, including all the recognizable variations.

The work represented by this paper has been done in the biological laboratory of the Normal University of New Mexico, under the direction of Mr. T. D. A. Cockerell, who has also revised the manuscript.



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